

# TCEQ Interoffice Memorandum

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**To:** Tony Walker  
Director, TCEQ Region 4, Dallas/Fort Worth  
Alyssa Taylor  
Special Assistant to the Regional Director, TCEQ Region 4, Dallas/Fort Worth

**From:** Stephanie Shirley, Ph.D. SS  
Toxicology Division, Office of the Executive Director

**Date:** April 8, 2014

**Subject:** Toxicological Evaluation of Results from an Ambient Air Sample for Volatile Organic Compounds Collected Upwind (1402014) and Downwind (1402013) of Tervita LLC, Horseshoe Saltwater Disposal (Latitude 32.5030890, Longitude -97.652938) in Cresson, Hood County, Texas

Sample Collected on January 28, 2014, Request Number 1402013 (Lab Sample 1402013-001) and 1402014 (Lab Sample 1402014-001)

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## Key Points

- Reported concentrations of target volatile organic compounds (VOCs) were either not detected or were detected below levels of short-term health and/or welfare concern.

## Background

On January 28, 2014, a Texas Commission on Environmental Quality (TCEQ) Region 4 air investigator collected a 30-minute canister sample upwind (Lab Sample 1402014-001) and downwind (Lab Sample 1402013-001) of Tervita LLC, Horseshoe Saltwater Disposal (Latitude 32.5030890, Longitude -97.652938) in Cresson, Hood County, Texas. The sample was collected as part of a follow-up investigation. The investigator experienced neither odors nor health effects while sampling. Meteorological conditions measured at the site or nearest stationary ambient air monitoring site indicated that the ambient temperature was 27.5°F with a relative humidity of 41.2%, and winds were from the northeast (50°) at 7.4-9.5 miles per hour. The downwind sampling site and nearest location where the public could have access was greater than 501 feet from the possible emission source (salt water disposal well). The sample was sent to the TCEQ laboratory in Austin, Texas, and analyzed for a range of VOCs. The list of the target analytes that were evaluated in this review are provided in Attachment A. The VOC concentrations were reported in parts per billion by volume (ppbv) (Attachment B and Table 1). Please note that the available canister technology and analysis method cannot capture and/or analyze for all chemicals.

## **Results and Evaluation**

Reported VOC concentrations were compared to TCEQ's short-term health- and/or welfare-based air monitoring comparison values (AMCVs) (Table 1). Short-term AMCVs are guidelines used to evaluate ambient concentrations of a chemical in air and to determine its potential to result in adverse health effects, adverse vegetative effects, or odors. Health AMCVs are set to provide a margin of safety and are set well below levels at which adverse health effects are reported in the scientific literature. If a chemical concentration in ambient air is less than its comparison value, no adverse health effects are expected to occur. If a chemical concentration exceeds its comparison value it does not necessarily mean that adverse effects will occur, but rather that further evaluation is warranted.

All of the 84 VOCs were either not detected or were detected below their respective short-term AMCVs. Exposure to levels of VOCs measured in this sample would not be expected to cause short-term adverse health effects, adverse vegetative effects, or odors.

Please call me at (512) 239-1808 if you have any questions regarding this evaluation.

## Attachment A

### List of Target Analytes for Canister Samples

|                         |                               |                           |
|-------------------------|-------------------------------|---------------------------|
| ethane                  | 4-methyl-1-pentene            | t-1,3-dichloropropylene   |
| ethylene                | 1,1-dichloroethane            | 1,1,2-trichloroethane     |
| acetylene               | cyclopentane                  | 2,3,4-trimethylpentane    |
| propane                 | 2,3-dimethylbutane            | toluene                   |
| propylene               | 2-methylpentane               | 2-methylheptane           |
| dichlorodifluoromethane | 3-methylpentane               | 3-methylheptane           |
| methyl chloride         | 2-methyl-1-pentene + 1-hexene | 1,2-dibromoethane         |
| isobutane               | n-hexane                      | n-octane                  |
| vinyl chloride          | chloroform                    | tetrachloroethylene       |
| 1-butene                | t-2-hexene                    | chlorobenzene             |
| 1,3-butadiene           | c-2-hexene                    | ethylbenzene              |
| n-butane                | 1,2-dichloroethane            | m & p-xylene              |
| t-2-butene              | methylcyclopentane            | styrene                   |
| bromomethane            | 2,4-dimethylpentane           | 1,1,2,2-tetrachloroethane |
| c-2-butene              | 1,1,1-trichloroethane         | o-xylene                  |
| 3-methyl-1-butene       | benzene                       | n-nonane                  |
| isopentane              | carbon tetrachloride          | isopropylbenzene          |
| trichlorofluoromethane  | cyclohexane                   | n-propylbenzene           |
| 1-pentene               | 2-methylhexane                | m-ethyltoluene            |
| n-pentane               | 2,3-dimethylpentane           | p-ethyltoluene            |
| isoprene                | 3-methylhexane                | 1,3,5-trimethylbenzene    |
| t-2-pentene             | 1,2-dichloropropane           | o-ethyltoluene            |
| 1,1-dichloroethylene    | trichloroethylene             | 1,2,4-trimethylbenzene    |
| c-2-pentene             | 2,2,4-trimethylpentane        | n-decane                  |
| methylene chloride      | 2-chloropentane               | 1,2,3-trimethylbenzene    |
| 2-methyl-2-butene       | n-heptane                     | m-diethylbenzene          |
| 2,2-dimethylbutane      | c-1,3-dichloropropylene       | p-diethylbenzene          |
| cyclopentene            | methylcyclohexane             | n-undecane                |

## Attachment B

2/19/2014

### Texas Commission on Environmental Quality

Laboratory and Quality Assurance Section  
P.O. Box 13087, MC-165  
Austin, Texas 78711-3087  
(512) 239-1716

### Laboratory Analysis Results

Request Number: 1402013

Request Lead:

Region: T04

Date Received: 2/10/2014

Project(s): Barnett Shale

| Facility(ies) Sampled                   | City     | County | Facility Type |
|---|----------|--------|---------------|
| Tervita LLC, Horseshoe Saltwater Dispos | Granbury | Hood   |               |

#### Sample(s) Received

Field ID Number: N0221-012814

Laboratory Sample Number: 1402013-001

Sampled by: Rachel Jackson

Sampling Site:

Date & Time Sampled: 01/28/14 12:20:00 Valid Sample: Yes

Comments: Canister N0221 was used to collect a 30-minute downwind sample using OFC-123.

Requested Laboratory Procedure(s):

Analysis: AP001VOC

Determination of VOC Canisters by GC/MS Using Modified Method TO-15

Please note that this analytical technique is not capable of measuring all compounds which might have adverse health effects. For questions on the analytical procedures please contact the laboratory manager at (512) 239-1716. For an update on the health effects evaluation of these data, please contact the Toxicology Division at (512) 239-1795.

Analyst: Jaydeep Patel  
Jaydeep Patel

Date: 02/19/14

Laboratory Manager: Ken Lancaster  
Ken Lancaster

Date: 2/24/14

### Laboratory Analysis Results

Request Number: 1402013

Analysis Code: AP001VOC

Note: Results are reported in units of ppbv

| Lab ID                        | 1402013-001  |      |     |               |         |       |     |     |               |         |
|-------------------------------|--------------|------|-----|---------------|---------|-------|-----|-----|---------------|---------|
| Field ID                      | N0221-012814 |      |     |               |         |       |     |     |               |         |
| Canister ID                   | N0221        |      |     |               |         |       |     |     |               |         |
| Compound                      | Conc.        | SDL  | SQL | Analysis Date | Flags** | Conc. | SDL | SQL | Analysis Date | Flags** |
| ethane                        | 13           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| ethylene                      | ND           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| acetylene                     | 0.47         | 1.0  | 2.4 | 2/13/2014     | J,T,D1  |       |     |     |               |         |
| propane                       | 5.9          | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| propylene                     | ND           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| dichlorodifluoromethane       | 0.54         | 0.40 | 1.2 | 2/13/2014     | L,D1    |       |     |     |               |         |
| methyl chloride               | 0.66         | 0.40 | 1.2 | 2/13/2014     | L,D1    |       |     |     |               |         |
| isobutane                     | 1.6          | 0.46 | 2.4 | 2/13/2014     | L,D1    |       |     |     |               |         |
| vinyl chloride                | ND           | 0.34 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 1-butene                      | 0.13         | 0.40 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1,3-butadiene                 | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-butane                      | 2.1          | 0.40 | 2.4 | 2/13/2014     | L,D1    |       |     |     |               |         |
| t-2-butene                    | ND           | 0.36 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| bromomethane                  | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| c-2-butene                    | 0.02         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 3-methyl-1-butene             | ND           | 0.46 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| isopentane                    | 0.55         | 0.54 | 4.8 | 2/13/2014     | L,D1    |       |     |     |               |         |
| trichlorofluoromethane        | 0.26         | 0.58 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1-pentene                     | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-pentane                     | 0.36         | 0.54 | 4.8 | 2/13/2014     | J,D1    |       |     |     |               |         |
| isoprene                      | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| t-2-pentene                   | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1-dichloroethylene          | ND           | 0.36 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| c-2-pentene                   | ND           | 0.50 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| methylene chloride            | 0.08         | 0.28 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methyl-2-butene             | ND           | 0.46 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,2-dimethylbutane            | ND           | 0.42 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| cyclopentene                  | ND           | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 4-methyl-1-pentene            | ND           | 0.44 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1-dichloroethane            | ND           | 0.38 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| cyclopentane                  | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3-dimethylbutane            | 0.01         | 0.56 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methylpentane               | 0.11         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 3-methylpentane               | 0.08         | 0.46 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methyl-1-pentene + 1-hexene | ND           | 0.40 | 4.8 | 2/13/2014     | D1      |       |     |     |               |         |
| n-hexane                      | 0.19         | 0.40 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| chloroform                    | ND           | 0.42 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| t-2-hexene                    | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| c-2-hexene                    | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2-dichloroethane            | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| methylcyclopentane            | 0.04         | 0.54 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2,4-dimethylpentane           | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,1-trichloroethane         | ND           | 0.52 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| benzene                       | 0.22         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| carbon tetrachloride          | 0.11         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| cyclohexane                   | ND           | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-methylhexane                | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3-dimethylpentane           | ND           | 0.52 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |

# Laboratory Analysis Results

Request Number: 1402013

Analysis Code: AP001VOC

Note: Results are reported in units of ppbv

| Lab ID                    | 1402013-001 |      |     |               |         |       |     |     |               |         |
|---------------------------|-------------|------|-----|---------------|---------|-------|-----|-----|---------------|---------|
| Compound                  | Conc.       | SDL  | SQL | Analysis Date | Flags** | Conc. | SDL | SQL | Analysis Date | Flags** |
| 3-methylhexane            | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2-dichloropropane       | ND          | 0.34 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| trichloroethylene         | ND          | 0.58 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,2,4-trimethylpentane    | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-chloropentane           | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-heptane                 | 0.08        | 0.50 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| c-1,3-dichloropropylene   | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| methylcyclohexane         | 0.06        | 0.52 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| t-1,3-dichloropropylene   | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,2-trichloroethane     | ND          | 0.42 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3,4-trimethylpentane    | ND          | 0.48 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| toluene                   | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-methylheptane           | 0.02        | 0.40 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 3-methylheptane           | 0.02        | 0.46 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1,2-dibromoethane         | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-octane                  | 0.05        | 0.38 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| tetrachloroethylene       | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| chlorobenzene             | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| ethylbenzene              | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| m & p-xylene              | 0.05        | 0.54 | 4.8 | 2/13/2014     | J,D1    |       |     |     |               |         |
| styrene                   | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,2,2-tetrachloroethane | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| o-xylene                  | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| n-nonane                  | ND          | 0.44 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| isopropylbenzene          | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-propylbenzene           | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| m-ethyltoluene            | ND          | 0.22 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| p-ethyltoluene            | ND          | 0.32 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,3,5-trimethylbenzene    | ND          | 0.50 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| o-ethyltoluene            | ND          | 0.26 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2,4-trimethylbenzene    | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-decane                  | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2,3-trimethylbenzene    | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| m-diethylbenzene          | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| p-diethylbenzene          | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-undecane                | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |

## Laboratory Analysis Results

Request Number: 1402013

Analysis Code: AP001VOC

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### Qualifier Notes:

ND - not detected  
NQ - concentration can not be quantified due to possible interferences or coelutions.  
SDL - Sample Detection Limit (Limit of Detection adjusted for dilutions).  
SQL - Sample Quantitation Limit (Limit of Quantitation adjusted for dilution).  
INV - Invalid.  
J - Reported concentration is below SDL.  
L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.  
E - Reported concentration exceeds the upper limit of instrument calibration.  
M - Result modified from previous result.  
T - Data was not confirmed by a confirmational analysis. Compound and/or results is tentatively identified.  
F - Established acceptance criteria was not met due to factors outside the laboratory's control.  
H - Not all associated hold time specifications were met. Data may be biased.  
C - Sample received with a missing or broken custody seal.  
R - Sample received with a missing or incomplete chain of custody.  
I - Sample received without a legible unique identifier.  
G - Sample received in an improper container.  
U - Sample received with insufficient sample volume.  
W - Sample received with insufficient preservation.

Quality control notes for AP001VOC samples.

D1-Sample concentration was calculated using a dilution factor of 4.

TCEQ laboratory customer support may be reached at [Ken.Lancaster@tceq.texas.gov](mailto:Ken.Lancaster@tceq.texas.gov)

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**Table 1. Comparison of Monitored Concentrations in Lab Sample 1402013-001 to TCEQ Short-Term AMCVs**

| Lab Sample ID                     | 1402013-001                   |  |                         |                                    |       |                         |
|-----------------------------------|-------------------------------|--|-------------------------|------------------------------------|-------|-------------------------|
| Compound                          | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags | SDL (ppb <sub>v</sub> ) |
| 1,1,1-Trichloroethane             | 380,000                       | 1,700                                      | 1.2                     | ND                                 | D1    | 0.52                    |
| 1,1,2,2-Tetrachloroethane         | 7,300                         | 10   | 1.2                     | ND                                 | D1    | 0.4                     |
| 1,1,2-Trichloroethane             | Not Available                 | 100  | 1.2                     | ND                                 | D1    | 0.42                    |
| 1,1-Dichloroethane                | Not Available                 | 1,000                                      | 1.2                     | ND                                 | D1    | 0.38                    |
| 1,1-Dichloroethylene              | Not Available                 | 180  | 1.2                     | ND                                 | D1    | 0.36                    |
| 1,2,3-Trimethylbenzene            | Not Available                 | 250  | 1.2                     | ND                                 | D1    | 0.54                    |
| 1,2,4-Trimethylbenzene            | 140                           | 250  | 1.2                     | ND                                 | D1    | 0.54                    |
| 1,2-Dibromoethane                 | Not Available                 | 0.5  | 1.2                     | ND                                 | D1    | 0.4                     |
| 1,2-Dichloroethane                | 6,000                         | 40   | 1.2                     | ND                                 | D1    | 0.54                    |
| 1,2-Dichloropropane               | 250                           | 100  | 1.2                     | ND                                 | D1    | 0.34                    |
| 1,3,5-Trimethylbenzene            | Not Available                 | 250  | 2.4                     | ND                                 | D1    | 0.5                     |
| 1,3-Butadiene                     | 230                           | 1,700                                      | 1.2                     | ND                                 | D1    | 0.54                    |
| 1-Butene                          | 360                           | 27,000                                     | 1.2                     | 0.13                               | J,D1  | 0.4                     |
| 1-Pentene                         | 100                           | 2,600                                      | 1.2                     | ND                                 | D1    | 0.54                    |
| 2,2,4-Trimethylpentane            | 670                           | 750  | 1.2                     | ND                                 | D1    | 0.48                    |
| 2,2-Dimethylbutane (Neohexane)    | Not Available                 | 1,000                                      | 1.2                     | ND                                 | D1    | 0.42                    |
| 2,3,4-Trimethylpentane            | Not Available                 | 750  | 2.4                     | ND                                 | D1    | 0.48                    |
| 2,3-Dimethylbutane                | 420                           | 990  | 2.4                     | 0.01                               | J,D1  | 0.56                    |
| 2,3-Dimethylpentane               | 4,500                         | 850  | 1.2                     | ND                                 | D1    | 0.52                    |
| 2,4-Dimethylpentane               | 940                           | 850  | 2.4                     | ND                                 | D1    | 0.54                    |
| 2-Chloropentane (as chloroethane) | Not Available                 | 240  | 1.2                     | ND                                 | D1    | 0.54                    |
| 2-Methyl-1-Pentene +1-Hexene      | 140                           | 500  | 4.8                     | ND                                 | D1    | 0.4                     |
| 2-Methyl-2-Butene                 | Not Available                 | 2,600                                      | 1.2                     | ND                                 | D1    | 0.46                    |



| Lab Sample ID                   | 1402013-001                   |  |                         |                                    |        |                         |
|---------------------------------|-------------------------------|--|-------------------------|------------------------------------|--------|-------------------------|
| Compound                        | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags  | SDL (ppb <sub>v</sub> ) |
| 2-Methylheptane                 | 110                           | 750  | 2.4                     | 0.02                               | J,D1   | 0.4                     |
| 2-Methylhexane                  | 420                           | 750  | 1.2                     | ND                                 | D1     | 0.54                    |
| 2-Methylpentane (Isohexane)     | 7,000                         | 850  | 1.2                     | 0.11                               | J,D1   | 0.54                    |
| 3-Methyl-1-Butene               | 250                           | 8,000                                      | 1.2                     | ND                                 | D1     | 0.46                    |
| 3-Methylheptane                 | 1,500                         | 750  | 2.4                     | 0.02                               | J,D1   | 0.46                    |
| 3-Methylhexane                  | 840                           | 750  | 1.2                     | ND                                 | D1     | 0.4                     |
| 3-Methylpentane                 | 8,900                         | 1,000                                      | 1.2                     | 0.08                               | J,D1   | 0.46                    |
| 4-Methyl-1-Pentene (as hexene)  | 140                           | 500  | 2.4                     | ND                                 | D1     | 0.44                    |
| Acetylene                       | Not Available                 | 25,000                                     | 2.4                     | 0.47                               | J,T,D1 | 1                       |
| Benzene                         | 2,700                         | 180  | 1.2                     | 0.22                               | J,D1   | 0.54                    |
| Bromomethane (methyl bromide)   | Not Available                 | 30   | 1.2                     | ND                                 | D1     | 0.54                    |
| c-1,3-Dichloropropylene         | Not Available                 | 10   | 1.2                     | ND                                 | D1     | 0.4                     |
| c-2-Butene                      | 2,100                         | 15,000                                     | 1.2                     | 0.02                               | J,D1   | 0.54                    |
| c-2-Hexene                      | 140                           | 500  | 2.4                     | ND                                 | D1     | 0.54                    |
| c-2-Pentene                     | Not Available                 | 2,600                                      | 2.4                     | ND                                 | D1     | 0.5                     |
| Carbon Tetrachloride            | 4,600                         | 20   | 1.2                     | 0.11                               | J,D1   | 0.54                    |
| Chlorobenzene (phenyl chloride) | 1,300                         | 100  | 1.2                     | ND                                 | D1     | 0.54                    |
| Chloroform (trichloromethane)   | 3,800                         | 20   | 1.2                     | ND                                 | D1     | 0.42                    |
| Cyclohexane                     | 2,500                         | 1,000                                      | 1.2                     | ND                                 | D1     | 0.48                    |
| Cyclopentane                    | Not Available                 | 1,200                                      | 1.2                     | ND                                 | D1     | 0.54                    |
| Cyclopentene                    | Not Available                 | 2,900                                      | 1.2                     | ND                                 | D1     | 0.4                     |
| Dichlorodifluoromethane         | Not Available                 | 10,000                                     | 1.2                     | 0.54                               | L,D1   | 0.4                     |
| Ethane                          | Not Available                 | Simple Asphyxiant*                         | 2.4                     | 13                                 | T,D1   | 1                       |
| Ethylbenzene                    | 170                           | 20,000                                     | 2.4                     | ND                                 | D1     | 0.54                    |
| Ethylene                        | 270,000                       | 500,000                                    | 2.4                     | ND                                 | T,D1   | 1                       |

| Lab Sample ID                        | 1402013-001                   |  |                         |                                    |       |                         |
|--------------------------------------|-------------------------------|--|-------------------------|------------------------------------|-------|-------------------------|
| Compound                             | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags | SDL (ppb <sub>v</sub> ) |
| Isobutane                            | Not Available                 | 33,000                                     | 2.4                     | 1.6                                | L,D1  | 0.46                    |
| Isopentane (2-methylbutane)          | 1,300                         | 68,000                                     | 4.8                     | 0.55                               | L,D1  | 0.54                    |
| Isoprene                             | 48                            | 20   | 1.2                     | ND                                 | D1    | 0.54                    |
| Isopropylbenzene (cumene)            | 48                            | 500  | 1.2                     | ND                                 | D1    | 0.48                    |
| m & p-Xylene (as mixed isomers)      | 80                            | 1,700                                      | 4.8                     | 0.05                               | J,D1  | 0.54                    |
| m-Diethylbenzene                     | 70                            | 460  | 2.4                     | ND                                 | D1    | 0.54                    |
| Methyl Chloride (chloromethane)      | Not Available                 | 500  | 1.2                     | 0.66                               | L,D1  | 0.4                     |
| Methylcyclohexane                    | 150                           | 4,000                                      | 2.4                     | 0.06                               | J,D1  | 0.52                    |
| Methylcyclopentane                   | 1,700                         | 750  | 2.4                     | 0.04                               | J,D1  | 0.54                    |
| Methylene Chloride (dichloromethane) | 160,000                       | 3,500                                      | 1.2                     | 0.08                               | J,D1  | 0.28                    |
| m-Ethyltoluene                       | 18                            | 250  | 1.2                     | ND                                 | D1    | 0.22                    |
| n-Butane                             | 1,200,000                     | 92,000                                     | 2.4                     | 2.1                                | L,D1  | 0.4                     |
| n-Decane                             | 620                           | 1,750                                      | 2.4                     | ND                                 | D1    | 0.54                    |
| n-Heptane                            | 670                           | 850  | 2.4                     | 0.08                               | J,D1  | 0.5                     |
| n-Hexane                             | 1,500                         | 1,800                                      | 2.4                     | 0.19                               | J,D1  | 0.4                     |
| n-Nonane                             | Not Available                 | 2,000                                      | 1.2                     | ND                                 | D1    | 0.44                    |
| n-Octane                             | 1,700                         | 750  | 2.4                     | 0.05                               | J,D1  | 0.38                    |
| n-Pentane                            | 1,400                         | 68,000                                     | 4.8                     | 0.36                               | J,D1  | 0.54                    |
| n-Propylbenzene                      | 48                            | 500  | 1.2                     | ND                                 | D1    | 0.54                    |
| n-Undecane                           | 870                           | 550  | 2.4                     | ND                                 | D1    | 0.54                    |
| o-Ethyltoluene                       | 74                            | 250  | 2.4                     | ND                                 | D1    | 0.26                    |
| o-Xylene                             | 380                           | 1,700                                      | 2.4                     | ND                                 | D1    | 0.54                    |
| p-Diethylbenzene                     | 70                            | 460  | 1.2                     | ND                                 | D1    | 0.54                    |
| p-Ethyltoluene                       | 8.1                           | 250  | 2.4                     | ND                                 | D1    | 0.32                    |
| Propane                              | 1,500,000                     | Simple Asphyxiant*                         | 2.4                     | 5.9                                | T,D1  | 1                       |

| Lab Sample ID           | 1402013-001      |                               |            |                       |       |            |
|-------------------------|------------------|-------------------------------|------------|-----------------------|-------|------------|
| Compound                | Odor AMCV (ppbv) | Short-Term Health AMCV (ppbv) | SQL (ppbv) | Concentrations (ppbv) | Flags | SDL (ppbv) |
| Propylene               | 13,000           | Simple Asphyxiant*            | 2.4        | ND                    | T,D1  | 1          |
| Styrene                 | 25               | 5,100                         | 2.4        | ND                    | D1    | 0.54       |
| t-1,3-Dichloropropylene | Not Available    | 10                            | 1.2        | ND                    | D1    | 0.4        |
| t-2-Butene              | 2,100            | 15,000                        | 1.2        | ND                    | D1    | 0.36       |
| t-2-Hexene              | 140              | 500                           | 2.4        | ND                    | D1    | 0.54       |
| t-2-Pentene             | Not Available    | 2,600                         | 2.4        | ND                    | D1    | 0.54       |
| Tetrachloroethylene     | 770              | 1,000                         | 1.2        | ND                    | D1    | 0.48       |
| Toluene                 | 920              | 4,000                         | 1.2        | ND                    | D1    | 0.54       |
| Trichloroethylene       | 3,900            | 100                           | 1.2        | ND                    | D1    | 0.58       |
| Trichlorofluoromethane  | 5,000            | 10,000                        | 1.2        | 0.26                  | J,D1  | 0.58       |
| Vinyl Chloride          | Not Available    | 26,000                        | 1.2        | ND                    | D1    | 0.34       |

\*A simple asphyxiant displaces air, lowering the partial pressure of oxygen and causing hypoxia at sufficiently high concentrations.

ppbv - Parts per billion by volume.

ND - Not detected.

NQ - Concentration can not be quantified due to possible interferences or coelutions.

SDL - Sample Detection Limit (Limit of Detection adjusted for dilution).

SQL – Sample Quantitation Limit (Limit of Quantitation adjusted for dilution).

INV - Invalid.

J - Reported concentration is below SDL.

L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.

E - Reported concentration exceeds the upper limit of instrument calibration.

M - Result modified from previous result.

T - Data was not confirmed by a confirmational analysis. Data is tentatively identified.

F - Established acceptance criteria were not met due to factors outside the laboratory's control.

H – Not all associated hold time specifications were met. Data may be biased.

C - Sample received with a missing or broken custody seal.

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R - Sample received with a missing or incomplete chain of custody.

I - Sample received without a legible unique identifier.

G - Sample received in an improper container.

U - Sample received with insufficient sample volume.

W - Sample received with insufficient preservation.

D1 - Sample concentration was calculated using a dilution factor of 4.

2/19/2014

**Texas Commission on Environmental Quality**

Laboratory and Quality Assurance Section  
P.O. Box 13087, MC-165  
Austin, Texas 78711-3087  
(512) 239-1716

**Laboratory Analysis Results**

**Request Number: 1402014**

Request Lead:

Region: T04

Date Received: 2/10/2014

Project(s): Barnett Shale

| Facility(ies) Sampled     | City    | County | Facility Type |
|---------------------------|---------|--------|---------------|
| Tervita LLC/Horseshoe SWD | Cresson | Hood   |               |

**Sample(s) Received**

Field ID Number: N0568-012814

Laboratory Sample Number: 1402014-001

Sampled by: Yvette Vaughan

Sampling Site:

Date & Time Sampled: 01/28/14 12:20:00 Valid Sample: Yes

Comments: Canister N0568 was used to collect a 30-minute upwind sample using OFC-076.

Requested Laboratory Procedure(s):

Analysis: AP001VOC

Determination of VOC Canisters by GC/MS Using Modified Method TO-15

Please note that this analytical technique is not capable of measuring all compounds which might have adverse health effects. For questions on the analytical procedures please contact the laboratory manager at (512) 239-1716. For an update on the health effects evaluation of these data, please contact the Toxicology Division at (512) 239-1795.

Analyst:

Jaydeep Patel  
Jaydeep Patel

Date:

02/19/14

Laboratory Manager:

Ken Lancaster  
Ken Lancaster

Date:

2/24/14

### Laboratory Analysis Results

Request Number: 1402014

Analysis Code: AP001VOC

Note: Results are reported in units of ppbv

| Lab ID                        | 1402014-001  |      |     |               |         |       |     |     |               |         |
|-------------------------------|--------------|------|-----|---------------|---------|-------|-----|-----|---------------|---------|
| Field ID                      | N0568-012814 |      |     |               |         |       |     |     |               |         |
| Canister ID                   | N0568        |      |     |               |         |       |     |     |               |         |
| Compound                      | Conc.        | SDL  | SQL | Analysis Date | Flags** | Conc. | SDL | SQL | Analysis Date | Flags** |
| ethane                        | 12           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| ethylene                      | ND           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| acetylene                     | ND           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| propane                       | 5.1          | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| propylene                     | ND           | 1.0  | 2.4 | 2/13/2014     | T,D1    |       |     |     |               |         |
| dichlorodifluoromethane       | 0.52         | 0.40 | 1.2 | 2/13/2014     | L,D1    |       |     |     |               |         |
| methyl chloride               | 0.57         | 0.40 | 1.2 | 2/13/2014     | L,D1    |       |     |     |               |         |
| isobutane                     | 0.85         | 0.40 | 2.4 | 2/13/2014     | L,D1    |       |     |     |               |         |
| vinyl chloride                | ND           | 0.34 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 1-butene                      | 0.07         | 0.40 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1,3-butadiene                 | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-butane                      | 1.7          | 0.40 | 2.4 | 2/13/2014     | L,D1    |       |     |     |               |         |
| t-2-butene                    | ND           | 0.36 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| bromomethane                  | 0.01         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| c-2-butene                    | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 3-methyl-1-butene             | ND           | 0.46 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| isopentane                    | 0.38         | 0.54 | 4.8 | 2/13/2014     | J,D1    |       |     |     |               |         |
| trichlorofluoromethane        | 0.25         | 0.58 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1-pentene                     | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-pentane                     | 0.29         | 0.54 | 4.8 | 2/13/2014     | J,D1    |       |     |     |               |         |
| isoprene                      | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| t-2-pentene                   | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1-dichloroethylene          | ND           | 0.36 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| c-2-pentene                   | ND           | 0.50 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| methylene chloride            | 0.06         | 0.28 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methyl-2-butene             | ND           | 0.46 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,2-dimethylbutane            | ND           | 0.42 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| cyclopentene                  | ND           | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 4-methyl-1-pentene            | ND           | 0.44 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1-dichloroethane            | ND           | 0.38 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| cyclopentane                  | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3-dimethylbutane            | ND           | 0.56 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-methylpentane               | 0.09         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 3-methylpentane               | 0.06         | 0.46 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methyl-1-pentene + 1-hexene | ND           | 0.40 | 4.8 | 2/13/2014     | D1      |       |     |     |               |         |
| n-hexane                      | 0.11         | 0.40 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| chloroform                    | 0.02         | 0.42 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| t-2-hexene                    | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| c-2-hexene                    | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2-dichloroethane            | 0.01         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| methylcyclopentane            | 0.03         | 0.54 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2,4-dimethylpentane           | ND           | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,1-trichloroethane         | ND           | 0.52 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| benzene                       | 0.21         | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| carbon tetrachloride          | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| cyclohexane                   | ND           | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-methylhexane                | ND           | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3-dimethylpentane           | ND           | 0.52 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |

### Laboratory Analysis Results

Request Number: 1402014

Analysis Code: AP001VOC

Note: Results are reported in units of ppbv

| Lab ID                    | 1402014-001 |      |     |               |         |       |     |     |               |         |
|---------------------------|-------------|------|-----|---------------|---------|-------|-----|-----|---------------|---------|
| Compound                  | Conc.       | SDL  | SQL | Analysis Date | Flags** | Conc. | SDL | SQL | Analysis Date | Flags** |
| 3-methylhexane            | 0.03        | 0.40 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 1,2-dichloropropane       | ND          | 0.34 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| trichloroethylene         | ND          | 0.58 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,2,4-trimethylpentane    | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2-chloropentane           | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-heptane                 | 0.05        | 0.50 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| c-1,3-dichloropropylene   | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| methylcyclohexane         | 0.04        | 0.52 | 2.4 | 2/13/2014     | J,D1    |       |     |     |               |         |
| t-1,3-dichloropropylene   | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,2-trichloroethane     | ND          | 0.42 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| 2,3,4-trimethylpentane    | ND          | 0.48 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| toluene                   | 0.07        | 0.54 | 1.2 | 2/13/2014     | J,D1    |       |     |     |               |         |
| 2-methylheptane           | ND          | 0.40 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 3-methylheptane           | ND          | 0.46 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2-dibromoethane         | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-octane                  | ND          | 0.38 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| tetrachloroethylene       | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| chlorobenzene             | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| ethylbenzene              | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| m & p-xylene              | 0.04        | 0.54 | 4.8 | 2/13/2014     | J,D1    |       |     |     |               |         |
| styrene                   | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,1,2,2-tetrachloroethane | ND          | 0.40 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| o-xylene                  | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| n-nonane                  | ND          | 0.44 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| isopropylbenzene          | ND          | 0.48 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-propylbenzene           | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| m-ethyltoluene            | ND          | 0.22 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| p-ethyltoluene            | ND          | 0.32 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,3,5-trimethylbenzene    | ND          | 0.50 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| o-ethyltoluene            | ND          | 0.26 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2,4-trimethylbenzene    | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-decane                  | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| 1,2,3-trimethylbenzene    | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| m-diethylbenzene          | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |
| p-diethylbenzene          | ND          | 0.54 | 1.2 | 2/13/2014     | D1      |       |     |     |               |         |
| n-undecane                | ND          | 0.54 | 2.4 | 2/13/2014     | D1      |       |     |     |               |         |

## Laboratory Analysis Results

Request Number: 1402014

Analysis Code: AP001VOC

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### Qualifier Notes:

ND - not detected  
NQ - concentration can not be quantified due to possible interferences or coelutions.  
SDL - Sample Detection Limit (Limit of Detection adjusted for dilutions).  
SQL - Sample Quantitation Limit (Limit of Quantitation adjusted for dilution).  
INV - Invalid.  
J - Reported concentration is below SDL.  
L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.  
E - Reported concentration exceeds the upper limit of instrument calibration.  
M - Result modified from previous result.  
T - Data was not confirmed by a confirmational analysis. Compound and/or results is tentatively identified.  
F - Established acceptance criteria was not met due to factors outside the laboratory's control.  
H - Not all associated hold time specifications were met. Data may be biased.  
C - Sample received with a missing or broken custody seal.  
R - Sample received with a missing or incomplete chain of custody.  
I - Sample received without a legible unique identifier.  
G - Sample received in an improper container.  
U - Sample received with insufficient sample volume.  
W - Sample received with insufficient preservation.

Quality control notes for AP001 VOC samples.

D1-Sample concentration was calculated using a dilution factor of 4.

TCEQ laboratory customer support may be reached at [Ken.Lancaster@tceq.texas.gov](mailto:Ken.Lancaster@tceq.texas.gov)

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**Table 2. Comparison of Monitored Concentrations in Lab Sample 1402014-001 to TCEQ Short-Term AMCVs**

| Lab Sample ID                     | 1402014-001                   |  |                         |                                    |       |                         |
|-----------------------------------|-------------------------------|--|-------------------------|------------------------------------|-------|-------------------------|
| Compound                          | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags | SDL (ppb <sub>v</sub> ) |
| 1,1,1-Trichloroethane             | 380,000                       | 1,700                                      | 1.2                     | ND                                 | D1    | 0.52                    |
| 1,1,2,2-Tetrachloroethane         | 7,300                         | 10   | 1.2                     | ND                                 | D1    | 0.4                     |
| 1,1,2-Trichloroethane             | Not Available                 | 100  | 1.2                     | ND                                 | D1    | 0.42                    |
| 1,1-Dichloroethane                | Not Available                 | 1,000                                      | 1.2                     | ND                                 | D1    | 0.38                    |
| 1,1-Dichloroethylene              | Not Available                 | 180  | 1.2                     | ND                                 | D1    | 0.36                    |
| 1,2,3-Trimethylbenzene            | Not Available                 | 250  | 1.2                     | ND                                 | D1    | 0.54                    |
| 1,2,4-Trimethylbenzene            | 140                           | 250  | 1.2                     | ND                                 | D1    | 0.54                    |
| 1,2-Dibromoethane                 | Not Available                 | 0.5  | 1.2                     | ND                                 | D1    | 0.4                     |
| 1,2-Dichloroethane                | 6,000                         | 40   | 1.2                     | 0.01                               | J,D1  | 0.54                    |
| 1,2-Dichloropropane               | 250                           | 100  | 1.2                     | ND                                 | D1    | 0.34                    |
| 1,3,5-Trimethylbenzene            | Not Available                 | 250  | 2.4                     | ND                                 | D1    | 0.5                     |
| 1,3-Butadiene                     | 230                           | 1,700                                      | 1.2                     | ND                                 | D1    | 0.54                    |
| 1-Butene                          | 360                           | 27,000                                     | 1.2                     | 0.07                               | J,D1  | 0.4                     |
| 1-Pentene                         | 100                           | 2,600                                      | 1.2                     | ND                                 | D1    | 0.54                    |
| 2,2,4-Trimethylpentane            | 670                           | 750  | 1.2                     | ND                                 | D1    | 0.48                    |
| 2,2-Dimethylbutane (Neohexane)    | Not Available                 | 1,000                                      | 1.2                     | ND                                 | D1    | 0.42                    |
| 2,3,4-Trimethylpentane            | Not Available                 | 750  | 2.4                     | ND                                 | D1    | 0.48                    |
| 2,3-Dimethylbutane                | 420                           | 990  | 2.4                     | ND                                 | D1    | 0.56                    |
| 2,3-Dimethylpentane               | 4,500                         | 850  | 1.2                     | ND                                 | D1    | 0.52                    |
| 2,4-Dimethylpentane               | 940                           | 850  | 2.4                     | ND                                 | D1    | 0.54                    |
| 2-Chloropentane (as chloroethane) | Not Available                 | 240  | 1.2                     | ND                                 | D1    | 0.54                    |
| 2-Methyl-1-Pentene +1-Hexene      | 140                           | 500  | 4.8                     | ND                                 | D1    | 0.4                     |
| 2-Methyl-2-Butene                 | Not Available                 | 2,600                                      | 1.2                     | ND                                 | D1    | 0.46                    |
| 2-Methylheptane                   | 110                           | 750  | 2.4                     | ND                                 | D1    | 0.4                     |

| Lab Sample ID                   | 1402014-001                   |  |                         |                                    |       |                         |
|---------------------------------|-------------------------------|--|-------------------------|------------------------------------|-------|-------------------------|
| Compound                        | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags | SDL (ppb <sub>v</sub> ) |
| 2-Methylhexane                  | 420                           | 750  | 1.2                     | ND                                 | D1    | 0.54                    |
| 2-Methylpentane (Isohexane)     | 7,000                         | 850  | 1.2                     | 0.09                               | J,D1  | 0.54                    |
| 3-Methyl-1-Butene               | 250                           | 8,000                                      | 1.2                     | ND                                 | D1    | 0.46                    |
| 3-Methylheptane                 | 1,500                         | 750  | 2.4                     | ND                                 | D1    | 0.46                    |
| 3-Methylhexane                  | 840                           | 750  | 1.2                     | 0.03                               | J,D1  | 0.4                     |
| 3-Methylpentane                 | 8,900                         | 1,000                                      | 1.2                     | 0.06                               | J,D1  | 0.46                    |
| 4-Methyl-1-Pentene (as hexene)  | 140                           | 500  | 2.4                     | ND                                 | D1    | 0.44                    |
| Acetylene                       | Not Available                 | 25,000                                     | 2.4                     | ND                                 | T,D1  | 1                       |
| Benzene                         | 2,700                         | 180  | 1.2                     | 0.21                               | J,D1  | 0.54                    |
| Bromomethane (methyl bromide)   | Not Available                 | 30   | 1.2                     | 0.01                               | J,D1  | 0.54                    |
| c-1,3-Dichloropropylene         | Not Available                 | 10   | 1.2                     | ND                                 | D1    | 0.4                     |
| c-2-Butene                      | 2,100                         | 15,000                                     | 1.2                     | ND                                 | D1    | 0.54                    |
| c-2-Hexene                      | 140                           | 500  | 2.4                     | ND                                 | D1    | 0.54                    |
| c-2-Pentene                     | Not Available                 | 2,600                                      | 2.4                     | ND                                 | D1    | 0.5                     |
| Carbon Tetrachloride            | 4,600                         | 20   | 1.2                     | ND                                 | D1    | 0.54                    |
| Chlorobenzene (phenyl chloride) | 1,300                         | 100  | 1.2                     | ND                                 | D1    | 0.54                    |
| Chloroform (trichloromethane)   | 3,800                         | 20   | 1.2                     | 0.02                               | J,D1  | 0.42                    |
| Cyclohexane                     | 2,500                         | 1,000                                      | 1.2                     | ND                                 | D1    | 0.48                    |
| Cyclopentane                    | Not Available                 | 1,200                                      | 1.2                     | ND                                 | D1    | 0.54                    |
| Cyclopentene                    | Not Available                 | 2,900                                      | 1.2                     | ND                                 | D1    | 0.4                     |
| Dichlorodifluoromethane         | Not Available                 | 10,000                                     | 1.2                     | 0.52                               | L,D1  | 0.4                     |
| Ethane                          | Not Available                 | Simple Asphyxiant*                         | 2.4                     | 12                                 | T,D1  | 1                       |
| Ethylbenzene                    | 170                           | 20,000                                     | 2.4                     | ND                                 | D1    | 0.54                    |
| Ethylene                        | 270,000                       | 500,000                                    | 2.4                     | ND                                 | T,D1  | 1                       |
| Isobutane                       | Not Available                 | 33,000                                     | 2.4                     | 0.85                               | L,D1  | 0.46                    |
| Isopentane (2-methylbutane)     | 1,300                         | 68,000                                     | 4.8                     | 0.38                               | J,D1  | 0.54                    |

| Lab Sample ID                        | 1402014-001                   |  |                         |                                    |       |                         |
|--------------------------------------|-------------------------------|--|-------------------------|------------------------------------|-------|-------------------------|
| Compound                             | Odor AMCV (ppb <sub>v</sub> ) | Short-Term Health AMCV (ppb <sub>v</sub> ) | SQL (ppb <sub>v</sub> ) | Concentrations (ppb <sub>v</sub> ) | Flags | SDL (ppb <sub>v</sub> ) |
| Isoprene                             | 48                            | 20   | 1.2                     | ND                                 | D1    | 0.54                    |
| Isopropylbenzene (cumene)            | 48                            | 500  | 1.2                     | ND                                 | D1    | 0.48                    |
| m & p-Xylene (as mixed isomers)      | 80                            | 1,700                                      | 4.8                     | 0.04                               | J,D1  | 0.54                    |
| m-Diethylbenzene                     | 70                            | 460  | 2.4                     | ND                                 | D1    | 0.54                    |
| Methyl Chloride (chloromethane)      | Not Available                 | 500  | 1.2                     | 0.57                               | L,D1  | 0.4                     |
| Methylcyclohexane                    | 150                           | 4,000                                      | 2.4                     | 0.04                               | J,D1  | 0.52                    |
| Methylcyclopentane                   | 1,700                         | 750  | 2.4                     | 0.03                               | J,D1  | 0.54                    |
| Methylene Chloride (dichloromethane) | 160,000                       | 3,500                                      | 1.2                     | 0.06                               | J,D1  | 0.28                    |
| m-Ethyltoluene                       | 18                            | 250  | 1.2                     | ND                                 | D1    | 0.22                    |
| n-Butane                             | 1,200,000                     | 92,000                                     | 2.4                     | 1.7                                | L,D1  | 0.4                     |
| n-Decane                             | 620                           | 1,750                                      | 2.4                     | ND                                 | D1    | 0.54                    |
| n-Heptane                            | 670                           | 850  | 2.4                     | 0.05                               | J,D1  | 0.5                     |
| n-Hexane                             | 1,500                         | 1,800                                      | 2.4                     | 0.11                               | J,D1  | 0.4                     |
| n-Nonane                             | Not Available                 | 2,000                                      | 1.2                     | ND                                 | D1    | 0.44                    |
| n-Octane                             | 1,700                         | 750  | 2.4                     | ND                                 | D1    | 0.38                    |
| n-Pentane                            | 1,400                         | 68,000                                     | 4.8                     | 0.29                               | J,D1  | 0.54                    |
| n-Propylbenzene                      | 48                            | 500  | 1.2                     | ND                                 | D1    | 0.54                    |
| n-Undecane                           | 870                           | 550  | 2.4                     | ND                                 | D1    | 0.54                    |
| o-Ethyltoluene                       | 74                            | 250  | 2.4                     | ND                                 | D1    | 0.26                    |
| o-Xylene                             | 380                           | 1,700                                      | 2.4                     | ND                                 | D1    | 0.54                    |
| p-Diethylbenzene                     | 70                            | 460  | 1.2                     | ND                                 | D1    | 0.54                    |
| p-Ethyltoluene                       | 8.1                           | 250  | 2.4                     | ND                                 | D1    | 0.32                    |
| Propane                              | 1,500,000                     | Simple Asphyxiant*                         | 2.4                     | 5.1                                | T,D1  | 1                       |
| Propylene                            | 13,000                        | Simple Asphyxiant*                         | 2.4                     | ND                                 | T,D1  | 1                       |
| Styrene                              | 25                            | 5,100                                      | 2.4                     | ND                                 | D1    | 0.54                    |
| t-1,3-Dichloropropylene              | Not Available                 | 10   | 1.2                     | ND                                 | D1    | 0.4                     |

| Lab Sample ID          | 1402014-001      |                               |            |                       |       |            |
|------------------------|------------------|-------------------------------|------------|-----------------------|-------|------------|
| Compound               | Odor AMCV (ppbv) | Short-Term Health AMCV (ppbv) | SQL (ppbv) | Concentrations (ppbv) | Flags | SDL (ppbv) |
| t-2-Butene             | 2,100            | 15,000                        | 1.2        | ND                    | D1    | 0.36       |
| t-2-Hexene             | 140              | 500                           | 2.4        | ND                    | D1    | 0.54       |
| t-2-Pentene            | Not Available    | 2,600                         | 2.4        | ND                    | D1    | 0.54       |
| Tetrachloroethylene    | 770              | 1,000                         | 1.2        | ND                    | D1    | 0.48       |
| Toluene                | 920              | 4,000                         | 1.2        | 0.07                  | J,D1  | 0.54       |
| Trichloroethylene      | 3,900            | 100                           | 1.2        | ND                    | D1    | 0.58       |
| Trichlorofluoromethane | 5,000            | 10,000                        | 1.2        | 0.25                  | J,D1  | 0.58       |
| Vinyl Chloride         | Not Available    | 26,000                        | 1.2        | ND                    | D1    | 0.34       |

\*A simple asphyxiant displaces air, lowering the partial pressure of oxygen and causing hypoxia at sufficiently high concentrations.

ppbv - Parts per billion by volume.

ND - Not detected.

NQ - Concentration can not be quantified due to possible interferences or coelutions.

SDL - Sample Detection Limit (Limit of Detection adjusted for dilution).

SQL – Sample Quantitation Limit (Limit of Quantitation adjusted for dilution).

INV - Invalid.

J - Reported concentration is below SDL.

L - Reported concentration is at or above the SDL and is below the lower limit of quantitation.

E - Reported concentration exceeds the upper limit of instrument calibration.

M - Result modified from previous result.

T - Data was not confirmed by a confirmational analysis. Data is tentatively identified.

F - Established acceptance criteria were not met due to factors outside the laboratory's control.

H – Not all associated hold time specifications were met. Data may be biased.

C - Sample received with a missing or broken custody seal.

R - Sample received with a missing or incomplete chain of custody.

I - Sample received without a legible unique identifier.

G - Sample received in an improper container.

U - Sample received with insufficient sample volume.

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W - Sample received with insufficient preservation.

D1 - Sample concentration was calculated using a dilution factor of 4.

**Table 3. TCEQ Long-Term Air Monitoring Comparison Values (AMCVs)**

**Please Note: The long-term AMCVs are provided for informational purposes only because it is scientifically inappropriate to compare short-term monitored values to the long-term AMCV.**

| Compound                          | Long-Term Health AMCV (ppb <sub>v</sub> ) | Compound                             | Long-Term Health AMCV (ppb <sub>v</sub> ) |
|-----------------------------------|---|--------------------------------------|---|
| 1,1,1-Trichloroethane             | 940                                       | Cyclopentane                         | 120                                       |
| 1,1,2,2-Tetrachloroethane         | 1   | Cyclopentene                         | 290                                       |
| 1,1,2-Trichloroethane             | 10  | Dichlorodifluoromethane              | 1,000                                     |
| 1,1-Dichloroethane                | 100                                       | Ethane                               | Simple Asphyxiant*                        |
| 1,1-Dichloroethylene              | 86  | Ethylbenzene                         | 450                                       |
| 1,2,3-Trimethylbenzene            | 25  | Ethylene**                           | 5,300                                     |
| 1,2,4-Trimethylbenzene            | 25  | Isobutane                            | 2,400                                     |
| 1,2-Dibromoethane                 | 0.05                                      | Isopentane (2-methylbutane)          | 8,000                                     |
| 1,2-Dichloroethane                | 1   | Isoprene                             | 2   |
| 1,2-Dichloropropane               | 10  | Isopropylbenzene (cumene)            | 50  |
| 1,3,5-Trimethylbenzene            | 25  | m & p-Xylene (as mixed isomers)      | 140                                       |
| 1,3-Butadiene                     | 9.1                                       | m-Diethylbenzene                     | 46  |
| 1-Butene                          | 2,300                                     | Methyl Chloride (chloromethane)      | 50  |
| 1-Pentene                         | Not Available                             | Methylcyclohexane                    | 400                                       |
| 2,2,4-Trimethylpentane            | 75  | Methylcyclopentane                   | 75  |
| 2,2-Dimethylbutane (Neohexane)    | 100                                       | Methylene Chloride (dichloromethane) | 100                                       |
| 2,3,4-Trimethylpentane            | 75  | m-Ethyltoluene                       | 25  |
| 2,3-Dimethylbutane                | 99  | n-Butane                             | 2,400                                     |
| 2,3-Dimethylpentane               | 85  | n-Decane                             | 175                                       |
| 2,4-Dimethylpentane               | 85  | n-Heptane                            | 85  |
| 2-Chloropentane (as chloroethane) | 24  | n-Hexane                             | 190                                       |
| 2-Methyl-1-Pentene +1-Hexene      | 50  | n-Nonane                             | 200                                       |

| Compound                        | Long-Term Health<br>AMCV (ppb <sub>v</sub> ) | Compound                | Long-Term Health<br>AMCV (ppb <sub>v</sub> ) |
|---------------------------------|--|-------------------------|--|
| 2-Methyl-2-Butene               | Not Available                                | n-Octane                | 75   |
| 2-Methylheptane                 | 75   | n-Pentane               | 8,000  |
| 2-Methylhexane                  | 75   | n-Propylbenzene         | 50   |
| 2-Methylpentane (Isohexane)     | 85   | n-Undecane              | 55   |
| 3-Methyl-1-Butene               | 800  | o-Ethyltoluene          | 25   |
| 3-Methylheptane                 | 75   | o-Xylene                | 140  |
| 3-Methylhexane                  | 75   | p-Diethylbenzene        | 46   |
| 3-Methylpentane                 | 100  | p-Ethyltoluene          | 25   |
| 4-Methyl-1-Pentene (as hexene)  | 50   | Propane                 | Simple Asphyxiant*                           |
| Acetylene                       | 2,500  | Propylene               | Simple Asphyxiant*                           |
| Benzene                         | 1.4  | Styrene                 | 110  |
| Bromomethane (methyl bromide)   | 3  | t-1,3-Dichloropropylene | 1  |
| c-1,3-Dichloropropylene         | 1  | t-2-Butene              | 690  |
| c-2-Butene                      | 690  | t-2-Hexene              | 50   |
| c-2-Hexene                      | 50   | t-2-Pentene             | Not Available                                |
| c-2-Pentene                     | Not Available                                | Tetrachloroethylene***  | 3.8  |
| Carbon Tetrachloride            | 2  | Toluene                 | 1,100  |
| Chlorobenzene (phenyl chloride) | 10   | Trichloroethylene       | 10   |
| Chloroform (trichloromethane)   | 2  | Trichlorofluoromethane  | 1,000  |
| Cyclohexane                     | 100  | Vinyl Chloride          | 0.45   |

\*A simple asphyxiant displaces air, lowering the partial pressure of oxygen and causing hypoxia at sufficiently high concentrations.

\*\*Long-term vegetation AMCV for Ethylene is 30 ppb.

\*\*\*Long-term vegetation AMCV for Tetrachloroethylene is 12 ppb.